MICRARIONTAS OF THE SOUTHWESTERN COLORADO DESERT

BY G. WILLETT

For several years past, in an endeavor to clarify the understanding of the *Micrariontas* of southeastern San Diego County and western Imperial County, California, the writer has been accumulating material from that region. Owing to the apparent scarcity of these shells, a considerable amount of effort has been necessary in order to secure enough good specimens for this study. Although dead and faded shells are not infrequently encountered, fresh ones are very difficult to obtain. However, the series now at hand in the Los Angeles Museum and the collection of the writer appears adequate to demonstrate the number of different races, their characters and distribution. A careful study of the above material indicates that there are four forms of *Micrarionta* in the territory under discussion, which includes Borego, Vallecito, Fish Creek, Carrizo and Laguna mountains. As three of these forms are quite similar and possess the common character of diagonal lines of merged papillae on the nuclear whorls, it is probably best to treat them as races of one species, as follows.

Micrarionta harperi harperi (Bryant). *M. ora* Willett.—Range, Vallecito (including Fish Creek) Mountains, north to San Felipe Narrows, Sentenac Canyon (both sides), and head of Blair Valley, and northeast side of Laguna Mountains (Agua Caliente Springs). Specimens examined from east side of Vallecito Mountains, near Borego Townsite, 16 (type lot of *M. ora*); east end of San Felipe Narrows, 37; Yaqui Wells, 3; Sentenac Canyon, 35; Blair Valley, 3; 2–3 miles west of Vallecito, 35, and Agua Caliente, 25.—Total, 154.

The largest of the three races (max. diam., 21.5 mm.), and averaging considerably darker in color. Papillation (in most specimens) only prominent on upper part of early whorls.

The writer's reasons for believing that this is the shell that Bryant (Naut., 28, 1929, p. 143) called *harperi* are: First, it appears to range closer to the "San Jacinto Mountains" and Warner Springs than any other member of the group. Second, no specimen as large as the type of *harperi* (diam., 17 mm.) has been

found among good series of both of the other two races. That Bryant's specimens came from either the San Jacinto Mountains, as now restricted, or Warner Springs, as believed by Berry (Proc. Acad. Nat. Sci. Phila., 74, 1922, p. 94), appears doubtful. No *Micrarionta* has since been found at Warner Springs, though diligently searched for by numerous conchologists. Furthermore, the type of terrain immediately contiguous to Warner Springs is not characteristic *Micrarionta* territory, and is occupied by *Helminthoglypta*. The shell here considered *herperi* occurs in Sentenac Canyon, 16 miles from Warner Springs. Apparently many early collectors failed to realize the importance of exact localities, and specimens from a considerable area might be recorded as from the place where the collector was making his headquarters. It is probable that this method was followed by Bryant. The shell figured by Berry (*op. cit.*) is, through the courtesy of the California Academy of Sciences, now before me. It is far from typical of *harperi,* apparently being an extreme variation. It is not mature and is much heavily papillated than is usual in this race, a feature that probably indicates a tendency toward *M. h. orcutti.*

Bryant's *Epiphragmophora bowersi* (Naut., 13, 1929, p. 122) is probably a *Helminthoglypta*. No known *Micrarionta* from the region has an "olivaceous" epidermis; furthermore, the type locality of *bowersi* is given as San Jacinto Mountains, *Riverside* County, which, on the west side of the mountains, would definitely be outside of *Micrarionta* territory.

MICRARIONTA HARPERI CARRIZOENSIS subsp. nov.—Resembles *M. h. harperi* in general sculpture (lacking strong papillation on later whorls), but much smaller (max. diam., 14 mm.), flatter and lighter colored. The type and thirty additional specimens (all dead) collected by the writer and his wife on hills above Painted Gorge, Carrizo Mountain, Imperial County, California, December 1, 1936.

The type, No. 1049, L. A. Mus., has 4 2/3 whorls, and measures: Max. diam., 14; min. diam., 11.6; alt. 7.7 mm. Paratypes in A.N.S.P. and collection of the writer.

MICRARIONTA HARPERI ORCUTTI (Bartsch).—Differs from the two previous races in rougher surface, and in beingly strongly

papillated, above and below, on all the whorls. Maximum diameter 16 millimeters, hence considerably smaller than *harperi* and slightly larger than *carrizoensis*. Varies somewhat in shape, but very little in sculpture. Known range (specimens taken by the writer), south end of Laguna Mountains, in both San Diego and Imperial counties, from one mile west of Mountain Springs to three miles east of that point. About fifty specimens (mostly dead) have been examined. An unusual feature of this shell is that it occurs, not only among rocks, but also under mats of dead agave plants. This is the only instance of an *Eremarionta* being found in such a situation that has come to the attention of the writer.

This form agrees closely with Bartsch's description and figure of his *orcutti,* from the "Colorado Desert," which, coupled with the fact that Orcutt believed his specimens (the type lot of *orcutti*) came from near Mountain Springs (Berry, *op. cit.*), would appear to justify the belief that this is Bartsch's species. Berry (*op. cit.*) calls attention to the fact that the name *orcutti* is preoccupied in the genus *Micrarionta,* therefore this race will require a new name.

The fourth race found in the territory under discussion here apparently has different affinities, and may be known as:

Micrarionta indioensis remota subsp. nov.—Shell small, thin, umbilicated. Color light horn, with narrow brown band; upper part of last whorl, between band and suture, clouded with grayish. First one and one half whorls with elongated papillae in diagonal rows, as in *indioensis* group; followed by wider spaced, irregularly shaped papillae, which gradually become fainter, being almost imperceptible on the latter part of the last whorl and on the base.

Nearest to *M. i. xerophila* Berry, but differs from that form in smaller size, duller coloration, narrower brown band, and lack of contrast in color between band and rest of whorl.

The type, no. 1050 L. A. Mus., has 4 1/2 whorls and measures: Diam., 13.3; alt., 8 mm. The largest specimen in the type lot measures 14.5 × 9.1 mm. The type and eight additional specimens (mostly dead) were collected by the writer and his wife on Borego Mountain, San Diego County, California, February 14, 1937.

Borego Mountain is an isolated hill just north of the Julian-Kane Springs highway, about seven miles east of San Felipe Narrows, and completely surrounded by the desert floor. It lies between the Vallecitos and the Santa Rosas, being about four miles from the former mountains and nine miles from the latter. The snail, however, is definitely related to the forms inhabiting the Santa Rosas. Although, as previously stated, this shell is very similar in outward appearance to *xerophila,* the genetic relationship of the two races can hardly be very close, as their ranges are forty miles apart, on different drainages, and another race, *indioensis,* occupies intervening territory.

EARLY TERTIARY MOLLUSCA FROM WYOMING

BY LORIS S. RUSSELL[1]

The pioneer work of the territorial surveys, and the early activities of the United States Geological Survey, brought to light a great series of non-marine Molusca from the Upper Crustaceous and Lower Tertiary rocks of the western states. This material, studied principally by F. B. Meek and C. A. White, was described in a number of government reports. The most valuable of these is White's "Review of the Non-marine Fossil Mollusca of North America."[2] Paleontologists of later years, however, have shown little interest in these continental mollusks, apparently because of the long geological range, as well as the marked variability, of many species.

Meanwhile, the succession of Tertiary formation in the west has become much better understood than in the days of Meek and White, largely as a result of the systematic study of mammalian faunas. Various field parties of the American Museum of Natural History, while engaged in collecting remains of mammals, obtained a large number of fossil shells, mostly from the lower Tertiary rocks of Wyoming and New Mexico. This material was described by Professor T. D. A. Cockerell, between 1912 and 1915, in the Bulletin of the American Museum of Natural His-

[1] Published with the permission of the Director, Geological Survey of Canada.

[2] U. S. Geol. Surv., 3rd Ann. Rept., pp. 403–486, 32 pls., 1883.